SUPPORT FOR THE AMENDMENTS

The present amendment cancels claims 1-7, and adds new claims 8-18.

Claims 1-7 have been cancelled, and new claims 8-18 have been added, to place these claims in a better condition for allowance. Support for these amendments is provided by the originally filed claims and specification.

Support for newly added claim 8 is found at specification page 2, lines 3-15, page 4, lines 8-11, 16-17 and 24, page 5, lines 1-4, as well as original claims 1-3.

Support for newly added claim 9 is found at specification page 7, lines 10-12.

Support for newly added claim 10 is found at claim 2 of the Article 34 amended sheet, as originally filed.

Support for newly added claims 11-12 is found at specification page 2, lines 16-21, page 3, lines 21-24, page 4, lines 20-22, as well as original claim 4.

Support for newly added claims 13 and 15 is found at specification page 3, lines 1-4, page 4, lines 8-11, as well as original claim 6.

Support for newly added claims 14 and 16-18 is found at specification page 8, lines 13-18, as well as original claims 5 and 7.

It is believed that these amendments have not resulted in the introduction of new matter.

REMARKS

Claims 8-18 are currently pending in the present application. Claims 1-7 have been cancelled, and new claims 8-18 have been added, by the present amendment.

The rejections of now cancelled: (1) claim 1 under 35 U.S.C. § 102(b) as being anticipated over Yuasa (U.S. Patent 2002/0048964); and (2) claims 2-4 under 35 U.S.C. § 103(a) as being obvious over Yuasa in view of Tsuda (U.S. Patent 6,335,546), are obviated by amendment, with respect to new claims 8-18.

New claim 8 recites a method for growing a thin bipolar gallium nitride film on a sapphire substrate, said method comprising: subjecting the sapphire substrate to H_2 cleaning; and treating the sapphire substrate, which has been subjected to H_2 cleaning, with a nitric acid solution having a nitric acid concentration of 6-63 %, wherein said treating is carried out at a temperature of 40°C for a period of 0 minutes to 10 minutes, whereby the thin bipolar gallium nitride film having a Ga face (+c) and a N face (-c) is grown on the sapphire substrate.

Yuasa describes a method for forming a gallium nitride semiconductor layer comprising: providing a substrate (e.g., glass or sapphire) having a portion which acts as a growth suppressing film on an outermost surface thereof; growing a thin gallium nitride growth promoting film on the substrate at a growth temperature of about 600°C; etching the thin gallium nitride growth promoting film to form a striped pattern with hot nitric acid (about 200°C); and growing a thick gallium nitride film on the thin gallium nitride growth promoting film at a growth temperature of about 1000°C (See e.g., abstract, [0012], [0019], [0048], [0056], [0057], [0061]).

Tsuda describes a nitride semiconductor structure and a process of producing the same comprising: thermal cleaning of a sapphire substrate having a c plane growth surface for about 10 minutes with H_2 gas at a temperature of about 1,025°C; and growing a nitride semiconductor film on the c plane growth surface at a growth temperature of about 1,000°C (See e.g., abstract, column 3, lines 31-35, column 9, lines 30-62).

According to the method of present invention, the Ga face (+c) is obtained by H_2 cleaning of the sapphire substrate, and the N face (-c) is obtained by H_2 cleaning of the sapphire substrate and nitriding at a low temperature of 40°C for a period of 0 minutes to 10 minutes (See e.g., page 4, line 8-14, page 5, lines 1-4).

As discussed in the present specification, conventional methods cannot significantly control the polarity of the thin nitride film because the high temperatures (e.g., 750-1,100°C or higher) typically associated therewith cancel out the effects of the previous substrate surface treatments (See e.g., page 1, lines 14-18, page 5, lines 4-8).

Yuasa describes growing a thin gallium nitride growth promoting film on the substrate at a high growth temperature of about 600°C.

Tsuda describes thermal cleaning of a substrate with H_2 gas at a high temperature of about 1,025°C and growing a nitride semiconductor film on the substrate at a high growth temperature of about 1,000°C.

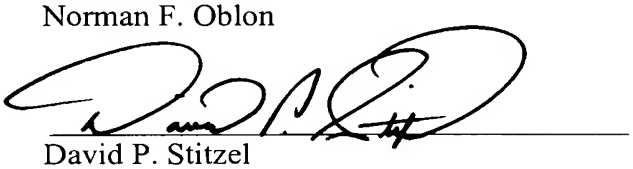
Yuasa and Tsuda, when considered alone or in combination, fail to disclose or suggest treating a sapphire substrate, which has been subjected to H_2 cleaning, with a nitric acid solution at a temperature of 40°C for a period of 0 minutes to 10 minutes, whereby a thin bipolar gallium nitride film having a Ga face (+c) and a N face (-c) is grown on the sapphire substrate, as presently claimed. A skilled artisan would not have arrived at the method of the present invention based on the disclosures of Yuasa and Tsuda, absent impermissible hindsight reconstruction. As a result, Yuasa and Tsuda fail to anticipate or render obvious the method of the present invention.

The rejection of claims 1-4 under 35 U.S.C. § 112, second paragraph, is obviated by amendment with respect to the cancellation of said claims. Withdrawal of this ground of rejection is respectfully requested.

In conclusion, Applicants submit that the present application is now in condition for allowance and notification to this effect is earnestly solicited.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.
Norman F. Oblon



David P. Stitzel
Attorney of Record
Registration No. 44,360

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)